

Superfund Site Center  
SITE: NEW BEDFORD  
BREAK: 4.6  
OTHER: 221018

COMMENTS SUBMITTED ON BEHALF OF AVX CORPORATION

ON

DRAFT FEASIBILITY STUDY OF REMEDIAL  
ACTION ALTERNATIVES, ACUSHNET RIVER  
ESTUARY ABOVE COGGESHALL STREET  
BRIDGE, NEW BEDFORD SITE,  
BRISTOL COUNTY, MASSACHUSETTS,  
AUGUST 1984 WITH ADDENDUM,  
SEPTEMBER 1984

JANUARY 15, 1985



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## INTRODUCTION

The upper Acushnet River Estuary is part of the New Bedford area listed by the Environmental Protection Agency ("EPA") as a site on the National Priority List in 1981, pursuant to its authority under the Comprehensive Environmental Compensation Response and Liability Act of 1980, 42 U.S.C. §9601 et seq. ("CERCLA"). EPA issued its final Remedial Action Master Plan ("RAMP") for the New Bedford site in May 1983.

While the RAMP details the scope of a broad and full remedial investigation and feasibility study for the New Bedford site (originally estimated to take two years (RAMP at A-32) but now expected to be concluded in 1986), it also established that certain priority sites would be the subject of "fast-track evaluation and remediation." Id. at 7. The only such priority sites identified in the RAMP were PCB sediment concentrations in the upper area of the Acushnet River Estuary. Id. at 5. Even before completion of any of the RAMP studies, EPA initiated legal action under CERCLA (and other statutory authorities) against six defendants, including AVX Corporation ("AVX") in December 1983.

In August 1984, EPA's contractor, NUS Corporation ("NUS"), issued the fast-track draft Feasibility Study for the upper Acushnet River Estuary, with a supplemental addendum

in September 1984. A public comment period on the draft feasibility study originally ran from August 23 to November 15, 1984. At the request of AVX (and the other defendants), EPA extended the comment period on the draft feasibility study until January 15, 1985.<sup>1/</sup> Before expiration of the extended comment period, however, EPA Regional Administrator Michael Deland announced that EPA's preferred options were "either to dredge contaminated sediments and dispose of them in a partially lined (bottom unlined) containment site in the northern part of the estuary, at an estimated cost of \$28 million, or to dredge contaminated sediments and dispose of them in a nearby upland containment site (yet to be selected), at an estimated cost of \$44 million."

Because of its interest in EPA activity in New Bedford, AVX has extensively reviewed the draft Feasibility Study, and other relevant data, from both a legal and technical perspective.<sup>2/</sup> As discussed more fully in these comments,

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<sup>1/</sup> EPA's agreement to accept defendants' comments as timely if submitted by January 15, 1985 came as a result of direct negotiation with defendants' counsel. This agreement was confirmed by letter dated November 5, 1984 from Bruce Allensworth, Ropes & Gray, counsel for Aerovox Incorporated, to Ralph A. Child, Assistant U. S. Attorney.

<sup>2/</sup> Technical comments are based on a review by Normandeau Associates, Inc., Environmental Consultants, 25 Nashua Road, Bedford, New Hampshire ("NAI").

AVX has concluded that the draft feasibility study is fatally deficient both legally and technically, primarily as a result of the unprecedented and unwarranted "fast-track" approach employed by EPA in this project.<sup>3/</sup>

I. LEGAL ANALYSIS

A. CERCLA AND THE NCP REQUIRE A FULL REMEDIAL INVESTIGATION AND FEASIBILITY STUDY PRIOR TO SELECTION AND IMPLEMENTATION OF REMEDIAL ACTION.<sup>4/</sup>

Under CERCLA, the alternatives proposed by NUS for the upper Achushnet River Estuary are classified as "remedial

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3/ Pursuant to defendants' agreement with the government, AVX's comments address the original draft feasibility study, although dredging aspects of the "preferred" options are discussed with particularity. It should also be noted that AVX and the other defendants named in the legal proceedings described above have repeatedly requested EPA to provide them with all information on which the feasibility study is based so that an independent review of the validity of NUS's conclusions and recommendations could be made. While AVX has no way of determining the completeness of such information as has been made available by EPA, certain of this information was not produced in a timely fashion so as to permit review for purposes of commenting on the draft feasibility study. To the extent such information is relevant, further comments by AVX will be forthcoming.

4/ A more extended analysis of the applicability of CERCLA and the NCP to the "fast-track" remedial program for the upper Achushnet River Estuary is set forth in comments made by Federal Pacific Electric Company.

actions." By definition such actions are primarily longer term responses "consistent with [a] permanent remedy." CERCLA §101(24), 42 U.S.C. §9601(24). Pursuant to the specific requirements of §104(a)(1) of CERCLA, 42 U.S.C. §9604(a), remedial actions must be consistent with the National Contingency Plan. See also CERCLA §107(a)(4)(A), 42 U.S.C. §9607(a)(4)(A) (response costs must be "not inconsistent" with NCP). Under CERCLA §105, 42 U.S.C. §9605, EPA must revise the National Contingency Plan to establish procedures and standards for responding to releases of hazardous substances, pollutants and contaminants consistent with CERCLA. Remedial actions taken by the EPA as authorized by CERCLA are, therefore, governed by the NCP promulgated in 1982. See 47 Fed. Reg. 31180 (July 16, 1982), 40 C.F.R. §300.

The revised NCP (formally the National Oil and Hazardous Substances Pollution Contingency Plan) extensively addresses implementation of the response powers and responsibilities created by CERCLA. Subpart F of the NCP is addressed solely to hazardous substances response; it establishes seven phases for discovering and assessing hazards of contamination to the public and the environment, determining whether there is a need for remedial action and assessing the technical and economic feasibility of alternative remedial measures.

Section 300.68 of the NCP specifically contains the governing requirements with respect to remedial action which have not been met here. The first step in remedial action is a remedial investigation. 40 C.F.R. §300.68(d)(1)(ii). Under the NCP, the remedial investigation is designed "to determine the nature and extent of the problem presented by the release," and should include "sampling and monitoring, as necessary, and the gathering of sufficient information to determine the necessity for and proposed extent of remedial action." 40 C.F.R. §300.68(f). Only after such information is gathered does the NCP provide for the development and initial screening of remedial alternatives. Id. at §300.68(g) and (h).

Section 300.68 of the NCP also establishes specific criteria that "should be assessed in determining whether and what type of source control remedial actions should be considered." Under §300.68(e)(2) of the NCP these include:

- The extent to which substances pose a danger to public health, welfare or the environment, including such factors as population at risk, amount and form of the substance present, hazardous properties of the substance, hydrological factors, and climate;
- The extent to which substances have migrated or are contained by either natural or manmade barriers;

- The experience and approaches used by governments to address similar releases in other areas;
- Environmental effects and welfare concerns.

40 C.F.R. §§300.68(e)(i)-(iv).

B. AS A RESULT OF FAST-TRACKING, THE DRAFT FEASIBILITY STUDY DOES NOT PROVIDE A LEGALLY OR TECHNICALLY ADEQUATE BASIS FOR ANY EPA DECISION REGARDING FINAL REMEDIAL ACTION IN COMPLIANCE WITH THE REQUIREMENTS OF CERCLA AND THE NCP.

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The draft feasibility study authored by NUS does not comply with the above-described requirements of the NCP concerning the scope of remedial investigation mandated before a feasibility study of remedial alternatives should be commenced and implementation of the selected remedial alternative begins. As a result, the feasibility study provides neither a technical nor a legal basis for EPA's rush to remediation of the upper estuary on a so-called fast-track.

Many of the deficiencies in the NUS study are referred to in the technical analysis presented below. These weaknesses arise largely because results of numerous studies outlined by the RAMP as necessary for a full and proper remedial investigation are not yet available. Hence, technical information needed to determine the nature and extent of the problem to be addressed, including "sampling and monitoring,

. . . and . . . gathering of sufficient information to determine the nature and extent of the problem . . . .," 40 C.F.R. §300.68(f), which presumably will be available at completion of the remedial investigation, is not compiled. Without such information, already determined to be critical to the remedial planning process, the NCP requirement that remedial action selected be cost-effective, "i.e., the lowest cost alternative that is technologically feasible and reliable and which effectively mitigates and minimizes damage to and provides adequate protection of public health, welfare or the environment . . . .," 40 C.F.R. §300.69(i), cannot possibly be met. See also 40 C.F.R. §300.69(k) (fund-balancing).

A fast-track approach does not justify short-cutting the well-considered requirements of the NCP.<sup>5/</sup> Nothing in

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5/ While CERCLA and NCP provide the means to address situations posing an "imminent and substantial endangerment to the public health or welfare or environment," CERCLA, §106, 42 U.S.C. §9606 or "exposure or threat of exposure to a significant health or environmental hazard," NCP, §300.68(e)(1), EPA is not proceeding on the basis of those provisions, nor (for reasons discussed above and in Pt. II. 3.2 below) could it do so on the facts and circumstances presented here.

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CERCLA<sup>6/</sup> or the NCP provides for fast-tracking, and EPA has acknowledged that its novel, unprecedented and precipitous approach does not permit the agency to ignore its legal obligations for remedial planning.<sup>7/</sup> Reliance on the incomplete feasibility study as the basis for any of the extensive remedial actions under consideration could lead to a "solution" which is neither cost-effective nor environmentally sound, with serious adverse effects on the environment and public health arising from the very "remedies" themselves, e.g. widespread dredging of contaminated sediments (see Pt. II. 1.1 below). Furtherance of the goals underlying the applicable CERCLA and NCP requirements will best be served by a more deliberate approach to solving the present problem of New Bedford Harbor.

So How does fast-track fail?  
Discussion is essentially conclusory?

6/ One specific provision of CERCLA (as opposed to the NCP) not being met is the requirement that a federal-state cooperative agreement be entered prior to remedial action. 42 U.S.C. §9604(c)(3). Among other things, §104(c)(3) requires that the state "assure the availability of a hazardous waste disposal facility. . . for any necessary offsite storage. . .," as would be necessary for one of NUS's remedial alternatives. In view of the state's November 15, 1984 letter expressing no support for the recommended upland disposal site, the state apparently could not enter into the required agreement at present.

7/ See RAMP at 7:

Fast-tracking essentially will limit only the time element, not the content, of the remedial process. Fast-track remedial implementation projects must, like normal projects, be demonstrated as cost-effective and consistent with a permanent site remedy.

C. THE DRAFT FEASIBILITY STUDY ALSO DOES NOT COMPLY WITH  
OTHER LEGAL REQUIREMENTS INCLUDING NEPA AND MEPA.

In addition to the specific requirements of CERCLA and the NCP, there are numerous other statutes with which EPA must comply before commencing remedial activity among them the *# choosing* National Environmental Policy Act (NEPA) of 1969, 42 U.S.C. §§ 4231 et seq.; the Massachusetts Environmental Policy Act (MEPA), M.G.L. c.30, §§61 et seq.; the Federal Water Pollution Control Act, 33 U.S.C. §§1251 et seq.; the Rivers and Harbors Act, 33 U.S.C. §§401 et seq.; the Coastal Zone Management Act, 15 U.S.C. §§1451 et seq.; the Resource Conservation and Recovery Act of 1976 ("RCRA"), 42 U.S.C. §§6910 et seq.; the Toxic Substances Control Act ("TSCA"), 15 U.S.C. §2601 et seq.; the Massachusetts Hazardous Waste Management Act, M.G.L. c.21C §§1 et seq. (and 310 C.M.R. §§ 30.000-30.909); the Massachusetts Hazardous Waste Facility Siting Act, M.G.L. c.21D, §§1 et seq.; the Massachusetts Wetlands Protection Act, M.G.L. c.131, §40; the Massachusetts Waterways Act, M.G.L. c.91 §§1 et seq.; and M.G.L. c.21, §43. (A discussion of these requirements is expected to be included in comments submitted on behalf of Cornell-Dubilier Electronics Company.)

Absent compliance with these legal protections, selection of a remedial alternative is legally improper.

*non-sequitur*

## II. TECHNICAL ANALYSIS

A technical review of the NUS fast-track feasibility study has led to the identification of numerous technical errors and omissions in the NUS study, which in turn lead to the conclusion that the existing data describing conditions in the upper Acushnet River Estuary is inadequate to select a remedial program for a site as large and as complex as New Bedford Harbor. More significantly, the report does not present a technical case for fast-tracking nor does it provide support for such an unprecedented mode of operation. References to NUS text are made in these comments by reference to report section, page and paragraph (e.g., 3-22, ¶ 2); the September 1984 Addendum is referred to as "Add."

### 1. TECHNICAL CONSIDERATIONS.

#### 1.1 SHORT-TERM ENVIRONMENTAL IMPACTS OF EPA REMEDIAL ACTIONS.

Although all of the remedial alternatives proposed would require dredging--all but one focusing heavily on dredging--NUS did not adequately address short-term adverse environmental impacts of dredging as distinct from in-place containment or treatment. Dredging would, for example, likely (1) generate PCB oil films in the harbor, (2) resuspend contaminated sediments, (3) increase volatilization of PCB and possibly other organic compounds, and (4) increase the likelihood of direct contact of PCB with the work force.

*As priority?*  
*Relative to what?*

\* The proposed NUS remedial programs will probably result in resuspending unknown but large quantities of contaminated sediments such that they could migrate up estuary or down estuary from the point of dredging, depending on the tide direction. Such releases of sediment could trigger PCB migration exceeding average natural migration by an order of magnitude, thus significantly reducing the benefits of the associated remedial program. NUS's assumption that resuspended contaminated sediments would resettle in less than thirty minutes has not been technically documented and appears to be inconsistent with the United States Coast Guard ("USCG") transport study. Thus, if dredging were undertaken, design and construction of an effective sediment control facility to meet the as yet undocumented or tested resuspension and transport conditions that would apply to dredging appears a critical safeguard.

In its report, pages 7-1 through 7-5, NUS presents its basis for the design and installation of sediment control structures which would limit the transport of contaminated sediments from the upper estuary into the lower estuary during a remedial dredging program. Various questions arise, given the sediment control system described, in addition to the question of resuspension and transport likely to result from dredging.

\* In plotting the average water/sediment velocity profile of the Acushnet River during periods of discharge to the lower estuary, it appeared that the suspended silt curtain would result in forcing suspended particles to a lower elevation in the river. However, the velocity profile beneath a silt curtain would be much higher than the average river profile, possibly causing particles to be resuspended in the water column due to flow turbulence and possibly, flow momentum. Higher water velocities beneath such a curtain might also scour the bottom, introducing additional sediment into the water column. These key issues should be addressed in the design of a silt curtain. The NUS report does not contain sedimentation rates (associated with the sediment control structure) or velocity profile calculations for the design of the sediment control facility, yet such calculations are important to review prior to addressing remediation.

\* The preliminary USCG transport study concludes that much PCB movement in the upper estuary comes from transport on superficial oil films, in soluble form, or on colloidal sediments (fine silts and clays). Notably, the sediment control structure proposed by NUS would appear to have little or no effect on the soluble or colloidal fraction of mobile PCB, and the structure as designed would contain only a small amount of oil film.

\* NUS has not adequately assessed PCB and other organic volatilization which would result from the proposed dredging activities, though it has identified PCB volatilization (from 20 acres of upper estuary mudflats) as a significant threat to human health. A quantitative assessment of volatilization risks associated with dredging should be completed by NUS prior to a decision as to whether dredging is the preferred remedial alternative.

\* According to current EPA policy, a "worst-case" analysis of potential environmental effects of a major federal action must be done under the National Environmental Policy Act ("NEPA") when significant adverse environmental impacts are reasonably foreseeable. NUS has not performed this analysis for dredging of the upper estuary. Failure to identify and correct the potential adverse impacts from dredging could lead to wide-spread contamination of the lower estuary and Buzzards Bay, recontamination of the upper estuary, and degraded air quality.

\* Other dredging projects similar in scope and size to the dredging proposed here by NUS have created odor and contaminated dust problems for the neighboring public. NUS has not assessed these concerns.

*State/Local?*

## 1.2 DATA INADEQUACIES

Significant information gaps exist concerning the New Bedford PCB situation. Four studies published before the New Bedford Remedial Action Master Plan ("RAMP") and one post-RAMP study, quoted below, have identified some critical gaps and requested further information, much of which is crucial to remedial planning. For example,

". . . before the PCB problem in the Acushnet River Estuary can be resolved, considerable further information is necessary" (Woods Hole Oceanographic Institution (WHOI) 1982).

"Further monitoring for PCB contamination and studies on the potential adverse environmental and health effects of PCBs in the State of Massachusetts are clearly needed" (Santos, 1981).

". . . studies to evaluate the long term health effects and chronic toxicity of PCBs should be implemented" in New Bedford (Santos, 1981).

Other information needs include the determination of what "effects of the contamination within and entering the system have on the human population living nearby and interacting with the system" (WHOI, 1982).

"Modeling studies should be undertaken to provide more reliable estimates of the effects of remedial dredging programs on PCB levels in aquatic organisms" (Malcolm Pirnie, 1982).

". . . a quantitative estimate of the extent of PCB reduction in species of commercial and recreational value cannot be made without additional study of PCB transport and uptake" (Malcolm Pirnie, 1982).

"Review of the data collected to date indicate the sampling results are insufficient to establish definitive PCB trends in the biota of New Bedford Harbor" (Kolek and Ceurvals, 1981).

"PCB analysis of the contaminated waterways in Massachusetts for forage fish, game fish and crustaceans should be performed to determine the levels and effects of PCB bio-accumulation" (Santos, 1981).

"These required data include data on the bio-accumulation of PCBs by shellfish and finfish from both the sediments and the water column" (WHOI, 1982).

"PCB concentrations in biological organisms inhabiting the Acushnet Estuary are also indicative of contamination. Particularly for the Inner Harbor, however, the data are limited and therefore somewhat inconclusive" (Metcalf & Eddy, 1983).

*\* ESTUARY*

"A thorough understanding of critical pathways and fate processes is probably one of the most significant 'data gaps' remaining in the Acushnet Estuary PCB issue" (Metcalf & Eddy, 1983).

"Also indicated, but not yet clearly defined, by the data base is the apparent degradation of PCBs (specifically the lower chlorinated isomers) in the estuarine environment. Photolytic decomposition and biodegradation may be occurring, for example, in both the aerobic and anaerobic portions of the mudflats lining the estuary. Similarly, there has been very little effort made to relate PCB concentrations in air to those of nearby sediments and surface waters, such that the volatilization from such sources could be quantified. It is anticipated that the significance of this and other PCB pathways will be identified in the modeling investigations" (Metcalf & Eddy, 1983).

*\* PCBs*  
"It should be noted, however, that the metals data in the file are only those collected in conjunction with PCBs (since that was the focus of this project), and do not constitute a comprehensive metals data base. Other available metals data should be obtained and incorporated into the system. With a larger metals data base, contour maps, like those for the PCB concentrations, could be developed to determine whether the locations of metals contamination coincide with the PCB hot spots. It will be especially important in evaluating cleanup alternatives (e.g. dredging) to know where and to what extent heavy metals are present in the estuary, as they may be more easily mobilized in the water column, may influence chemical reactions, and can also be extremely toxic" (Metcalf & Eddy, 1983).

*EP  
sampling*

"Most of the New Bedford area air monitoring has been conducted in areas of known or suspected PCB

contamination. There are relatively few data records representing "background" PCB levels in the air around New Bedford and Fairhaven" (Metcalf & Eddy, 1983).

"The proposed modeling of sediment transport and PCB dynamics for the estuary (Project 007 Pathways Study) will provide much of the information crucial to the planning of remedial action alternatives" (emphasis added; Metcalf & Eddy, 1983).

"These required data include an elucidation of the physical transport of PCBs in the harbor and out to Buzzards Bay" (WHOI, 1982).

The New Bedford RAMP responded to these informational needs by formulating various study projects, planned or currently underway:

Project 001 AMBIENT AIR TESTING: designed "to permit judgment of the effects of known contaminant sources on ambient air quality in the study area." "EPA will use these data as baseline information to be included in the decision-making process of selecting appropriate remedial responses, and in determining the effectiveness of remedial actions in reducing fugitive PCB emissions" (RAMP, referred to here in Pt. II as Weston, 1983).

Project 003 SAMPLING PROGRAM-ESTUARY/HARBOR/BAY: designed to "fulfill the data requirements of Project Work Statement 007 and, where such data is lacking, comprehensively define the lateral and vertical distribution of PCBs and other selected contaminants in the Harbor/Bay System" (Weston, 1983).

Project 006 INVESTIGATION OF UNDISCLOSED SOURCES: designed to "[i]dentify, evaluate, and document sources and sites of PCB contamination which are presently suspected or unknown" (Weston, 1983).

Project 007 INVESTIGATION OF PATHWAYS: designed to "[e]valuate the distribution, transport, and fate of PCBs and other contaminants - including trophic relationships - in New Bedford Harbor and Buzzards Bay, and to predict the effects of various remedial actions." "The lead agency will make judgments of the effectiveness of various remedial alternatives and will establish action levels consistent with protection of human and fish populations" (Weston, 1983).

While presumably the results of these RAMP projects were intended to be used in remedial planning, none of the results to date have been used for the evaluation of proposed fast-track options. Without these studies, NUS has been able to make only qualitative evaluations in many cases; such evaluations may not provide either the environmentally safest or the most cost-effective remediation and cannot adequately be evaluated on the strength of current information alone.

### 1.2.1 VALIDITY OF ANALYTICAL DATA

Many concerns exist regarding the validity of the existing chemical data base used by NUS. Metcalf & Eddy's review did not adequately demonstrate the reliability of the data.

Concerns include:

- \* The methods used to collect samples from the harbor area were not described by the data base consultant. Due to the age of some of the data, it is likely that crude sampling methods were used resulting in the collection of non-representative samples. In particular, the validity of samples obtained at depth may have been affected by more surficial contamination due to the loose nature of the harbor sediment and the difficulty of obtaining samples from a discrete interval.

- \* Improper or incomplete sample container and sampling equipment decontamination may have resulted in cross-contamination of samples and inaccurate analytical results.

- \* Sample locations were poorly documented, resulting in uncertainty in the real extent of the contaminants.

- \* Since many samples were taken prior to the development of accepted sampling protocols in the past few years, sample

documentation, chain-of-custody, labeling, preservation and shipment techniques were likely inadequate, making verification of sample validity impossible.

\* Due to improvements in the analytical chemistry techniques in the recent past, the accuracy of many of the less recent PCB analyses is in question. Aroclor differentiation and PCB identification, as contrasted with other organic compounds, was often inaccurate in the past and may be questionable if certain analytical techniques are employed.

\* Quality assurance efforts to verify PCB and metals analyses were likely marginal or non-existent for many of the analyses. QA/QC programs and results should be included by NUS to address this concern.

\* Due to the large number of parties collecting the sediment and water samples, it is likely that some participants were inexperienced in analytical sample collection procedures. Cross-contamination from improper sample handling (e.g. failure to decontaminate gloves and protective gear between collection of each sample) could result in gross cross-contamination of samples.

\* If sample compositing was not performed in the field, the analytical results are not representative of the depth interval or location from which the sample was collected.

#### 1.2.2 PCB DISTRIBUTION

\* Neither the vertical nor horizontal PCB distributions in the sediment have yet been documented adequately, despite being potentially the most influential factors in determining the scope, cost and ultimate choice of any remedial program. Such vertical and horizontal dimensions would, for example, be needed to establish discrete areas for sediment capping (e.g., as proposed in the NUS rechannelization option or on an even smaller scale), or to establish the appropriate volume of sediment to be dredged, if dredging were to occur (e.g., as proposed in all NUS options), or to meaningfully compare proposals presented to other alternatives not discussed (e.g., other current and emerging technologies).

\* The extensive area proposed (Add. 2-1, ¶1) for fast track remediation (approximately 202 acres north of the Coggeshall Street Bridge) has not been justified quantitatively. Previous reports indicate that the area requiring remediation is not yet defined:

*Design* "More precise delineation of 'hot spots' in the immediate vicinity of Aerovox, Inc. may warrant further sampling for cost-effective remedial action. Along the narrow neck

south of the industrial complex, there is a one kilometer stretch of river which has been sampled considerably less than the rest of the harbor, thus concentrations there remain relatively undefined" (Metcalf & Eddy, 1983).

"In addition, the further resolution of sediment PCB concentrations in areas not well sampled, and the addition of more metals data to the data base, will permit the development of more comprehensive, and statistically significant, contour maps delineating areas requiring remedial action" (Metcalf & Eddy, 1983).

"In order to refine the technical aspects of remedial dredging programs and their associated costs several studies should be undertaken including . . . a probing and sampling study of harbor sediments" (Malcolm Pirnie, 1982).

The NUS report is of necessity at this stage based only on the very data which is the subject of these critiques. In light of identified deficiencies and field work underway to meet these deficiencies, it seems highly imprudent to base remediation on such an inadequate data base. It is puzzling that NUS should propose an area for remediation which may unnecessarily enlarge the scope of any remedial actions, with associated increased costs, health and environmental risks.

*These quotes  
on not pre-  
clude NUS  
in preparing  
either design  
or remedial  
monitoring  
program*

\* The blanket depth proposed (Add. 2-1, ¶1) for fast track remediation (3 feet of sediment) is not well justified in light of previous reports. Raw data from the Malcolm Pirnie report (Malcolm Pirnie, 1982) lists 230 sediment data points (8% of the total, usable sediment data base). Of these, only 3 are samples taken below 18 inches. If this 8% of the sediment data base is representative of the extent of sampling below 18 inches, as it appears, then the extent of contamination levels

*design  
issue*

below 18 inches is not defined. NUS estimated (Add. 2-30, ¶13) that at depths ranging from 18 to 36 inches, sediments contain PCB dating from periods of initial usage in the area (the 1940's). However, sedimentation in the Acushnet River Estuary appears to be highly variable from location to location, and rates have differed over time (e.g. due to the erection of the hurricane dike). NUS should provide calculations, assumptions (including any safety factor) and data to support a 3 foot (91 cm) removal depth, especially in light of the lack of any meaningful data regarding the vertical distribution of PCB, as suggested by the following reports:

"The maps also indicate that the most severely contaminated sediments lie approximately 4 to 8 cm deep, an important fact in planning remedial operations . . . " (Metcalf & Eddy, 1983).

"These required data include a precise delineation of PCB sediment concentrations in the New Bedford area, profiled with depth" (WHOI, 1982).

"Most contamination resides in the uppermost 6 to 12 inches (of sediment) with substantial attenuation below this level" (Weston, 1983).

Much better definition of contaminant depth distribution in the upper estuary is critical to a sound remedial selection process. If, for example, contamination (whether PCB, metals or other) were found to be greater than the NUS assumed 3 foot depth, then dredging versus in site containment options would compare quite differently than would be the case if PCB concentrations at depth were less or the real extent of PCB was more defined. As proposed by NUS, and without such fundamental

data to plan with, the scope of remedial work could change dramatically midway through a remedial action depending on the contamination actually discovered as distinct from what is simply being assumed. Similarly, environmentally sound options feasible for lesser contamination depths may be rejected prematurely based on the 3 foot deep contamination assumption.

\* Proper delineation of areas of contamination is even more important to map definitively, since this delineation could significantly influence a comparison of in-place containment and dredging options (the scope of in-place containment is independent of contaminant depth). NUS assumes that approximately 202 acres will require remediation, though it indicates on 3-12, ¶1 that a 0.25 mile stretch of river is relatively undefined (Metcalf & Eddy reports, however, that 0.62 miles of river is relatively undefined (Metcalf & Eddy, 1983)). With some areas included in this NUS assumption but highly undefined as to actual PCB contamination, a choice of remediation using this assumption may cause unnecessarily large-scale disruption of the upper estuary when a more discrete remedial program would protect health and the environment equally or more effectively.

\* NUS states (3-8, ¶4) that no data has been collected to assess whether contamination exists in the saltwater marshes on the Fairhaven side of the estuary. If these areas are

contaminated, as NUS hypothesizes, then the contamination should be defined and addressed in conjunction with remedial planning for the remainder of the upper estuary.

### 1.2.3 NON-PCB CONTAMINATION

\* The type, extent, nature, location and distribution of non-PCB contaminants also are not well defined. Heavy metals, while not well-documented, are believed to exist in substantial quantities. Furthermore, given many decades (approaching a century) of industrial activity in this area--including, for example, the metal plating industry with its associated use of volatile solvents, substantial uncertainty exists as to other types of harbor pollution. To undertake the disturbance of 3 feet of sediment throughout the estuary without knowing what volatilization or human health risks may be created thereby could be ill-advised.

\* Although little appears yet to be known about heavy metal contamination of the upper estuary, the presence and extent of particular materials would be important to document for a proper remedial assessment. If, for example, large amounts of hexavalent chromium, a highly toxic form of chromium, were present (with the potential to be solubilized and thus released to the environment during dredging), that potential release would affect the evaluation of dredging vs. in situ containment.

If, on the other hand, a definitive sampling program established that heavy metal and PCB contamination did not coincide appreciably, other remedial alternatives such as emerging bio-technologies might be both feasible and environmentally preferable to dredging.

#### 1.2.4 GEOTECHNICAL DATA

\* No data pertaining to the chemical and physical properties of the upper estuary sediment was cited by NUS. Such information is important when considering PCB issues--such as the PCB partitioning coefficient of these sediments, transport with sediment, compaction characteristics, organic content, dewatering characteristics, methane gas generation potential, sedimentation rates, grain size and a host of other issues which should be evaluated as part of a remedial program selection process. The outcome of these assessments would bear directly on the feasibility of landfill remedial options as opposed to other remedial technologies.

\* Throughout its report, NUS notes correctly that the geotechnical properties of the deeper estuary sediments need further characterization (1-6, ¶1, 2-18, ¶3 and 7-3, ¶4). The NUS report refers only to general data from six borings made near the Coggeshall Street Bridge and five borings made in and near the cove. Such limited testing does not, statistically or

technically, provide sufficient data to design control structures such as those proposed by NUS. The presence of 0 to 30 feet of silty sediment in the harbor may present conditions resulting in large differential settlements after loading, or structural failure (the allowable bearing pressure for loose sediment is typically very low). Prior to judging the feasibility of constructing such large facilities on estuarine sediments, it appears logical to perform a boring and soil engineering properties testing program. Such a program would provide the data needed to evaluate design and construction methodology for the proposed structures in the river--rechannelization embankments or waste impoundment berms--and to judge the relative feasibility of each associated remedial program.

\* The lack of clarity and detail concerning proposed construction techniques for various remedial options is an outgrowth, in part, of the lack of data as to geotechnical properties of the harbor sediment. Because these harbor sediments are presently so ill-defined, construction methods (and costs) can at best be only general and speculative.

\* No basis was presented for NUS's estimate of settlement after placement in an on-site landfill. As sediments dewater over time, some subsidence would be expected. (Significant subsidence might also reduce the integrity of the landfill

cap.) If settlement estimates have been incorporated into the design, it would be helpful to know what calculations were used, so as to better evaluate expected performance.

\* The NUS description of methodology for construction of channel embankments and waste containment berms raises related questions. On page 7-6, for example, NUS states that glacial till will be placed to construct the core of the two embankments until the material is even with the existing water level. It is not clear how these materials are expected to be placed, how they would be compacted during installation, or how much settlement is anticipated. If not properly installed, the integrity of the river channel berms or walls of the waste landfill would be questionable and might result in the structural failure of the berms, leading in turn to a large release of sediment.

\* It is not clear that contaminated sediments should be removed from beneath containment berms as NUS proposes. NUS states that removal would prevent squeezing of contaminated sediments from beneath the berms (8-8, ¶5), but if such squeezing is anticipated, it may indicate a chronic condition which would lead ultimately to berm failure. If squeezing does not occur, it appears that this area would be stable enough to contain the underlying sediments, and attempts at removal would only produce unnecessary cost and risk.

#### 1.2.5 DESIGN CONSIDERATIONS

\* NUS has not adequately addressed how recontamination of remediated areas in the upper estuary will be avoided if the proposed remedial dredging projects were implemented.

Recontamination may be caused by at least the following mechanisms:

1. During remedial dredging, contaminated sediment would be resuspended, and a certain percentage of the contaminated sediment would resettle in adjacent, previously dredged areas. If not addressed in the planning stages, recontamination may add significantly to the program scope to the extent that recontaminated areas were to require redredging.
2. Since the NUS proposed remedial dredging programs are projected to be implemented over a 2-3 year span, storms and windy days will certainly be encountered. High winds have the potential of resuspending contaminated sediments, particularly in shallow waters, such that they will resettle in remediated areas. Details of procedures, structures, and technologies designed to minimize or eliminate recontamination of remediated areas from the effects of wind and storm events should be thought through and

described specifically in the feasibility study to assess the potentially significant increases in work scope. If not addressed in planning, costs and risks of a remedial dredging program (should redredging of recontaminated areas be required) could impact the project profoundly.

\* NUS notes on 8-4 through 8-5 that the proposed embankments for rechannelization of the river were designed to contain the 100-year flood and that the loss of flood storage capacity in the tidal flats created by such a channel would result in insignificant water level increases. The data leading to those important conclusions has not been presented; the underlying calculations should be disclosed.

\* NUS discusses a water exchange phenomenon which would occur between the capped upper estuary flats (part of their hydraulic control and sediment capping option) and the lower harbor (7-6, ¶2). That exchange phenomenon raises numerous questions, e.g.,:

1. How much exchange is to be expected from the lower estuary to the flats of the capped upper estuary?
2. How much exchange would be required to prevent stagnation in the upper estuary?
3. How much cap erosion will occur at the exchange entrance?

Questions of this type should be addressed fully in order to assess the viability of the proposal; they have not been discussed by NUS in the report.

\* NUS generally describes a proposed process for capping of upper estuary sediments (7-9, ¶12) but leaves unclear both how or whether cap sediments dredged from Buzzards Bay would be dewatered, and if dewatered, how any resulting water would be handled. Dewatering in this context would likely require elaborate procedures impacting both scheduling and costs.

\* The construction of landfills proposed by NUS includes an impermeable geomembrane cap element to limit surface water infiltration to the landfill (7-16, ¶13). NUS believes that potential methane/carbon dioxide gas build-up beneath the surface cap of the landfill to be insignificant (8-11 through 8-12). That conclusion, however, may not be warranted and no basis for it is presented in the report itself. In particular, data describing the organic content of the sediments is necessary to evaluate the gas generation process. Methane generation in landfills has been a recurrent problem at other sites, resulting in the installation of gas collection systems in many solid waste landfills. Additionally, methane generation problems have affected public malls and commercial buildings constructed over fill containing a high organic content. Based on such past experiences, it would be prudent

to fully evaluate potential gas generation beneath, and especially within, the proposed landfills. Pending such evaluation, the design and cost estimate for the proposed landfills cannot be considered appropriate or cost-effective.

\* Efforts to construct in-harbor containment structures proposed by NUS, whether temporary or permanent, would be massive. Particular aspects of construction warrant special discussion due to their potential to adversely affect the constructability, quality and cost of facilities of the type proposed:

- NUS correctly notes that, if a lined in-harbor containment facility were constructed, dewatering of the site would be necessary and very expensive (7-19). However, due to the difficulty in dewatering a site of this size and nature, the costs of dewatering and effluent treatment may be much larger than anticipated. Additionally, until such a lined structure were completely filled and capped, dewatering would probably have to be continued in order to prevent blow-out of the bottom liner due to hydrostatic pressure. Dewatering might also be required for a non-lined landfill to facilitate material placement and handling.
- The proposed foundation design for waste containment berms includes placement of a thick sand layer, a minimum of four feet, over the sediments in order to support the glacial till berm. Since such a sand layer may have high hydraulic conductivity, it must be determined whether tidal fluctuations would affect the landfill as designed by NUS. The design of major facilities such as these should reflect long-term integrity with respect to contaminant containment.
- In comparing remedial programs, if an hydraulic connection were created between the harbor and contaminated sediments, it does not appear that the partially lined in-harbor containment facility offers a greater benefit than would the rechannelization and sediment capping proposal.
- The efficacy of any dewatering performed with respect to the proposed landfill could be substantially reduced or eliminated if the hydraulic connection were strong.

- NUS notes that the placement of an effective underwater sediment cap presents very difficult engineering problems. Construction of a secure, in-harbor waste disposal facility would present no less challenging engineering questions, answers to which are not realistic with the lack of information describing geologic conditions and geotechnical properties at the project area.
- The proposed placement of Cell No. 1 of the in-harbor subsurface disposal alternative at the discharge point of the Acushnet River channel into the upper estuary raises concerns. During periods of high river flow, the flow might well be sufficient in speed and quantity to scour the cap of Cell No. 1 and release contaminated sediments to remediated areas. With sediments proposed for deposit in Cell No. 1 containing some of the highest PCB levels in the project area, a release from Cell No. 1 could significantly reduce any beneficial impacts expected from the remedial program.
- The stability of the proposed berm separating the in-harbor underwater disposal cells during construction of the cells is open to question. As an example, how would the loose silt berm on the downriver side of Cell No. 1 respond after Cell No. 1 was filled and Cell No. 2 excavated?
- Proposed underwater sediment placement methods should be clarified. While contaminated sediments have been deposited in underwater cells at other sites, the nature of each site is obviously different and the remedial methodology used must be tailored to meet particular site conditions. The method used to place the contaminated sediment in a containment cell is critical in a program of this type. If done improperly, it may result in excessive resuspension of particles, elutriation of sediments and unwanted contaminant migration. NUS has not included a detailed description of any proposed placement method.
- The method contemplated to place a 3 foot cap of sediment over underwater containment cells bears comment. If not properly performed, cap placement may result in mixing clean with contaminated sediment during placement, hence producing a contaminated cap and a correspondingly diminished benefit.
- How would inspections be done to evaluate the condition of underwater in-harbor cell caps (Add. 2-28, ¶1)? No discussion is contained in the NUS report.

\* In all remedial options proposed by NUS, sediment control is a highly significant element because extensive dredging is contemplated. However, since contaminated sediment would be returned to the estuary as part of the in-harbor underwater containment cell option, the approach to sediment control with this option must be especially effective, due to the additional vulnerability of the lower estuary in the event of migration of the captured sediments.

\* On a related matter, NUS does not discuss methods of sediment placement in underwater cells to minimize environmental harm which might result during this procedure from exposing PCB contaminated sediment before capping is complete. Particularly in severe storm conditions, uncompleted cells might be the source of substantially greater pollution than would occur from storms given the configuration of cleaner deposits presently covering contaminated estuary subsurface sediments. Costs and risks have not been addressed by NUS.

\* NUS states in Add. 2-29, ¶4 that no relocation of outfalls will be required if dredging is done. But it appears highly probable that relocation of outfalls would be necessary to facilitate dredging and/or after dredging is complete.

\* It is not clear what NUS means by the statement "Mobility and the most likely environmental fate of the identified

contaminants point toward the transport routes" (3-23, ¶12).  
This comment should be clarified.

\* On 6-17, it appears that NUS prefers the single embankment rechannelization option to double embankment based on a cost comparison, construction time and resulting impacts. However, elsewhere, NUS states a double wall embankment has been selected as the better option and discusses construction methodology of the double wall system in detail (7-1, ¶12). This appears to be a discrepancy needing clarification.

\* How PCB is related to "the lack of a replacement" for the Route 6 Bridge (3-35, ¶13) is unclear and should be examined.

### 1.3 REMEDIAL PCB ACTION LEVEL BASIS

\* The one part per million (ppm) PCB action level for the upper estuary appears to have been arbitrarily selected. Action levels of 50 ppm were recently selected and approved by the EPA for PCB remediation of the Hudson River, Waukegan Harbor, and Sheboygan Harbor. Additionally, 50 ppm appears to be the likely PCB action level for remediation of the Housatonic River (Housatonic River Study 45 Day Interim Report, October 1984). Each of these sites possess similar PCB exposure routes as those present at New Bedford Harbor. Thus, in past precedent under CERCLA, 50 ppm appears to be a

reasonable action level to limit public and environmental exposure to PCB from prior disposal areas.

\* A significant factor in the selection of the PCB action level is the impact the action level has on the cost and scope of remediation. NUS assumes that costs of remediating to 1 ppm are comparable to costs for remediating to 50 ppm. This conclusion has not been borne out at other sites and would be no more true for remediation of the New Bedford site. Based on studies performed for other sites, the cost of a dredging alternative based on a 1 ppm action level could well be ten times as great as an alternative based on 50 ppm. Due to the gross lack of data describing PCB concentration at depths in the upper estuary, the depths of dredging to achieve different action levels (and associated costs) is incalculable at present, though costs are likely to vary widely. The additional cost and risk to the public for one particular action level, here the unprecedented CERCLA action level of 1 ppm, as compared to others, should be justified prior to its implementation.

\* NUS assumes that dredging technology requires a minimum removal of 3 feet of sediment, which, in their opinion, would result in a 1 ppm cleanup level. Selection of 1 ppm as the project action level was apparently based in part on this assumption. NUS notes on C-26 and C-30 that the maximum

single-pass dredge depth is 18 inches. Thus, 3 feet, and by extension the 1 ppm cleanup level, is not dictated by dredging technology referenced in the study.

#### 1.4 REMEDIATION COST UNCERTAINTY

The NUS report leaves major cost uncertainties associated with its proposed remedial actions, and severe gaps in data make any meaningful cost projections and comparisons exceedingly difficult. Specific examples follow:

- \* The areal (horizontal) extent of PCB contamination has not been adequately defined and significantly affects the scope and cost of all proposed remedial activities.

- \* The vertical extent of PCB contamination is barely addressed at all in existing data and could drastically impact the cost of all remedial options involving dredging.

- \* Assumptions as to the nature of subsurface conditions in the upper estuary are based on sketchy information; a significantly different foundation for containment berms might be required if less favorable conditions are encountered, resulting in much higher project costs.

\* Little consideration was given to the effects that storm events and weather may have on dredging activities and their associated costs.

\* Recontamination possibilities in the course of remedial dredging could dramatically alter cost projections.

\* Dewatering costs were omitted from the NUS estimates and would likely be significant.

\* Construction methodology for major components of the NUS alternatives were not presented in meaningful detail. These elements include: sediment dewatering, construction of the underwater portion of earthen containment walls, placement of liners in the in-harbor landfill, placement of sediment cap, and ability to treat large volumes of water resulting from dredging activities and sediment dewatering.

\* No costs for long term maintenance were included in the estimates, though this is potentially a significant factor in the over-all cost picture.

\* If a fast-track remediation were pursued, in-process redesign will almost certainly be required to meet unexpected conditions. Attendant costs, above and beyond the allowed contingency, and an unplanned for expansion of project scope,

could result in very significant cost increases, perhaps doubling the projections now being made.

\* Without reliable data to support technical aspects of the NUS proposed remedial alternatives, a meaningful feasibility comparison--which requires cost-effectiveness analysis as well as assessment of environmental trade-offs -- cannot be made, whether between the various NUS alternatives themselves or between a given NUS proposal and other possibilities.

#### 1.5 ADEQUACY OF RISK AND ENVIRONMENTAL IMPACT ASSESSMENTS

##### 1.5.1 RISK ASSESSMENT

\* Throughout its report, NUS has referred qualitatively to perceived advantages, disadvantages and risks associated with the various alternatives proposed. Although data gaps make comparisons difficult, apparently little effort has been made to assign risk factors to pertinent variables or to perform a quantitative risk assessment. Likewise, there has been no apparent effort to assign economic values so as to perform the necessary cost/benefit analyses. Without a better quantitative foundation, selection of the optimum response action is not likely to be well thought out.

\* If, qualitatively, biota have been adversely impacted as portrayed in Sections 3.2.2 and 3.2.3 of the NUS report, then to limit the analysis to PCB concentration data and to

qualitative discussions on biota impact conveys little concerning to what degree and how local populations have been affected. Comprehensive sediment, water and biota data to be collected under RAMP Projects 003 and 007 should permit trophic relationships to be evaluated, biota impacts to be quantified and cost-versus-benefit of biota impact to be weighed more meaningfully.

\* To date, the apparent extent of the EPA risk assessment for the upper estuary leading to a fast-track approach has been to identify certain presumed risks associated with the site (as perceived by EPA): namely, human dermal exposure to PCB at the estuary mudflats; inhalation of volatile PCB emanating from the upper estuary; ingestion of fish containing PCB; and the release of up to 2,000 pounds of PCB per year to the environment. An independent assessment of these potential adverse effects has been performed by NAI and is presented in Sections 2.1 and 3.2. In summary, that assessment indicates a much lower level of risk than claimed by the EPA, and does not indicate the need for fast-tracking a remedial approach.

\* NUS has identified the following "factors" which must be considered for risk assessment (NUS Section 3.3):

- Present conditions in the estuary
- Mobility and fate of contaminants

- Likelihood of exposure
- Health effects
- Environmental impacts

NUS's own assessment of limitations with respect to available data for evaluation of such factors leads to a caveat in the report:

"Any limitations on the extent to which these factors can be evaluated will limit the scope of the risk assessment and inferred conclusions. This assessment is based largely on chemical analytical data gathered during past studies that were not specifically planned around health and environmental risk assessments. Consequently, the assessment is mainly based on the expected behavior of the particular contaminants in the general site environment" (3-22, ¶2).

If anything, this limitation does not adequately indicate NUS's failure to engage in an appropriate risk assessment for the project. Serious deficiencies in the existing data relied on by NUS concerning physical conditions in the estuary have already been discussed. The numerous questions raised regarding the USCG transport study undermine NUS's assumptions regarding PCB mobility and fates. In the caveat quoted above, NUS underscores its failure to engage in any specific assessment of likelihood of human exposure, health effects or environmental impacts as of this time. While information presently being developed as part of the ongoing RAMP projects will facilitate such assessment in the future, it does not affect the study's failure to engage in meaningful risk

assessment now. (This topic is discussed more fully in comments submitted by Federal Pacific Electric Company.)

#### 1.5.2 ENVIRONMENTAL ASSESSMENT

\* As noted, NUS has apparently not conducted a scientific assessment of the environmental impacts associated with its proposed remedial alternatives as they relate to either present or future conditions.

\* No description of the environmental nature of the upper estuary was included in the NUS report and little discussion was included regarding seasonal or year-round environmental uses of the estuary.

\* Regarding impacts of remedial alternatives, NUS has performed little evaluation of the short-term and long-term impacts on the estuary resulting from each proposed alternative, and has failed to predict the future environmental setting associated with each alternative. No comparison of environmental effects (beneficial or detrimental) of the proposed options was performed. Without such analyses, and an explanation of their bases, it would be impossible to assess objectively relative merits, or lack of merit, among alternatives.

## 1.6 CONSEQUENCES OF PARTIAL ESTUARINE REMEDIATION

\* NUS focuses on remedial programs for the upper estuary without detailed attention to the interaction of the upper estuary with adjacent areas, particularly the lower estuary. As noted in the USCG PCB transport study, large amounts of sediment (some containing PCB and other contaminants) travel out of and into the upper estuary from the lower estuary during each tidal cycle. Proceeding with remediation of the upper estuary in isolation ignores whether the upper estuary would become recontaminated after remediation has taken place due to the inflow of PCB affected sediment from the lower estuary.

\* Furthermore, NUS discussed contaminant source control measures for upper estuary sediment only, not for other sources of upper estuary contamination (e.g. selected private properties and outfalls into Buzzards Bay and the Acushnet River Estuary). Again, it is short-sighted to consider cleanup absent a comprehensive plan for securing unchecked sources of harbor/estuary contamination. On-shore and off-shore remediation should be evaluated using an integrated basis before final remediation is chosen. It appears that RAMP Projects 008 (Feasibility) and 006 (Undisclosed Sources) may be of value in that regard (one specific task of Project 008 being to identify, develop and evaluate source control actions (Weston, 1983)).

If an overall coherent plan is not in place, any remediation benefits that might be accomplished in the upper estuary may be undone by re-pollution, with attendant detriments of unnecessary additional effort, expense and risk to the public.

## 2. EPA TRANSPORT MODEL

### 2.1 THE USCG TRANSPORT STUDY

An apparent central reason offered by NUS for fast-tracking cleanup of the upper estuary is the conclusion that up to 2,000 lbs of PCB per year move, net, from the upper estuary to the lower estuary and Buzzards Bay. The basis for this estimated level of net migration was not included in the NUS report, although the USCG transport study for the upper estuary is believed to have been the source.

The USCG study raises several questions and concerns relating to both methodology and results:

1. There is no support for the USCG conclusion that the measurement of a mean water velocity at a single point (the lower third only of USCG's Station B2) is representative of the velocity through the entire channel cross-section.
2. Certain key terms used by USCG (e.g., "Median Area" used in Table 5 and "Average PCB Concentration") are not defined.

3. Rates of PCB transport significantly different from USCG measurements were found during the NAI study and indicated a net transport of PCB into the upper estuary during the second day of the USCG study, possibly attributable to a bias in the time the ebb data was collected.
4. If extrapolation of annual transport rates is valid based on the USCG data, the NAI evaluation of net annual PCB transport from the upper estuary indicated it to be on the order of 700 lbs per year, much less than the 2,000 lbs per year estimated by the USCG.
5. The USCG methodology used to determine PCB concentration is not adequately described, especially for determining the particulate versus soluble fractions of PCB. The text of the USCG study was ambiguous in describing whether 0.45 micron or 6.5 micron filters were used to separate the filterable and non-filterable fractions of PCB in water samples.
6. Additionally, it is not clear from the USCG report whether independent chemical analyses were performed to determine the total, filterable and non-filterable fractions of PCB in water samples. If only two of these three fractions were directly analyzed, with the third fraction being deduced, the data base may contain an undesirable bias.

In summary, the findings of the USCG study appear to be seriously flawed, with the actual rate of PCB migration from the upper estuary probably much less than EPA estimates. These questions substantially undermine the basis for NUS's key assumption as to PCB transport.

## 2.2 OTHER TRANSPORT CONSIDERATIONS

Without the results of the Pathways Study, which will do modeling of PCB exchanges through the mouth of the hurricane barrier, it is difficult to determine the extent to which

inner-outer harbor exchanges of PCB occur. Summerhayes, et al., have noted that metals transport from the upper estuary to central Buzzards Bay has occurred (Summerhayes, et al., 1977). However, no valid conclusions can be made regarding potential future (or indeed past) PCB transport based on these findings alone, since the Summerhayes estimate--that up to 24% of the metals present in Buzzards Bay came from the New Bedford Harbor (where, apparently, the harbor's major source of heavy metal input was located 1/2 mile south of the Coggeshall Street Bridge)--does not address the time frame in which the majority of such transport occurred. This metals discharge is known to have spanned 80 years, only during the last 20 of which has the hurricane barrier been in place to reduce tidal flushing of the harbor. Prior to the barrier's installation, extensive tidal flushing of the New Bedford Harbor apparently occurred, probably allowing the wide dispersion of heavy metals in central Buzzards Bay. Transport of pollutants out of the harbor since the barrier was erected may have become negligible.

A further reason not to extend the Summerhayes conclusions to PCB transport phenomenon is that differences in the transport mechanisms for PCB and metals exist due to the different molecular charges, densities, solubilities and chemical nature of these substances.

### 3. EVALUATION OF PROJECT MANAGEMENT

#### 3.1 REMEDIAL ALTERNATIVE PRIORITIZATION AND EVALUATION

##### 3.1.1 REMEDIAL ALTERNATIVE PRIORITIZATION

\* During November 1984, EPA Region I formally announced its preliminary selection of preferred remedial programs for the upper Acushnet River Estuary: (1) dredging with storage of dredge materials in an in-harbor partially lined landfill, and (2) dredging with storage of dredge materials in an upland landfill. EPA's selection of the remedial alternatives, months before the public comment period closed (and apparently without the benefit of state input, see November 15, 1984 letter from DEQE to EPA), was extremely premature and suggests a dredging bias that cannot be justified with on presently available data.

\* One proposed option includes removal of the upper estuary sediments and disposal of these sediments in an off-site landfill. Two other alternatives envision dredging sediments and on-site landfilling. Such programs utilized on previous Superfund sites resulted in the "Toxic Waste Merry-Go-Round" described by Mr. Lee Thomas, current EPA Administrator, in the July 19, 1984 Washington Post. The concept of transporting wastes from one location to another for storage has not been shown to be effective in preventing release of the wastes to

the environment. Additionally, the landfill proposed by NUS to receive the harbor sediments, the CECOS facility in Niagara Falls, New York (6-5, ¶1), was reported in the July 19, 1984 Washington Post article to be leaking. It would not appear appropriate to transport the sediments from the New Bedford Harbor to a landfill currently being questioned by the EPA.

### 3.1.2 INVALID COMPARISON OF REMEDIAL ALTERNATIVES

\* In their summary section, NUS states that hydraulic control and sediment capping is the only option which isolates, rather than removes, contaminated sediments (9-3, ¶1). However, because of the uncertainty over the degree of hydraulic connection that might occur between the proposed in-harbor landfills and harbor waters, in situ containment may accomplish better or equivalent isolation. The in-harbor partially lined landfill identified in November 1984 as the EPA preferred option cannot be considered superior to in-place containment based on this consideration.

\* Comparing the harbor subsurface cells option to the in situ containment option, the risks from potential scouring and uncontrolled contaminant migration should a cap be breached are much greater for the former than for the latter. In-harbor cells, used in the former option, would be more susceptible to river scouring due to their location. Also, if a cell cap were

breached during a storm event, sediments within the river channel could be more easily transported to the lower estuary and bay than would sediments behind rechannelization embankments. NUS views the probability of a cap breach and significant contaminant migration from the underwater in-harbor containment cells to be low (Add. 2-27, ¶3). The basis for this conclusion, and the comparative risks of the two approaches, should be presented. Subjective analyses alone are not appropriate for a judgment of this magnitude and import.

\* NUS states that "the two principal beneficial impacts of dredging are the consequent reductions in PCB concentrations in the water column and reduced PCB accumulations in fish" (Add. 2-24, ¶1). These goals are not unique to dredging, nor can it be shown with existing data that dredging would accomplish these goals better than other alternatives.

### 3.1.3 OTHER REMEDIAL TECHNOLOGIES

The EPA Research and Development Laboratory in Cincinnati, Ohio is presently developing chlorine/glycol substitution reactions which might be used to solubilize PCB such that it becomes readily available for microbial transformation and degradation. General Electric Company ("GE") is known to be extensively involved in similar research, as well as in accelerated mutation of naturally occurring microbes. The

intent of the GE mutation process is to accelerate the isolation of microbes which can most effectively degrade PCB. Other private firms are likewise involved in biotechnological research aimed at enhanced degradation of PCB in the environment.

It is believed that GE has also isolated naturally occurring aerobic and anaerobic microbes which appear viable for the degradation of PCB and is in the process of determining microbial nutrient needs and preferred living conditions for such microbes. Distinct microbes for the degradation of single, double and triple chlorine PCB isomers have been isolated. Significant progress has been made in isolating specific microbes for the degradation of quadruple and quintuple chlorine PCB isomers. Using these naturally occurring microbes, the biodegradation process produces dissociated chlorine atoms and phenolic byproducts through a series of chlorine stripping and shifting steps. GE, currently testing these degradation products to determine their nature and associated toxicity, considers the byproducts discovered to date to be non-hazardous.

This aspect of remedial technology may prove to be very relevant to conditions at the New Bedford site, particularly as existing data suggests that limited decomposition of PCB is naturally occurring in the estuary. According to the data base

management consultant, "[a]lso indicated but not clearly defined by the data base is the apparent degradation of PCBs (specifically the lower chlorinated isomers) in the estuarine environment" (Metcalf & Eddy, 1983).

The literature "indicates that microbial degradation and natural weathering can be an effective mechanism for removal of PCB from the environment" (Santos, 1981). In 1972, Nisbet and Sarofin found that when released into the environment, the following commercial PCB mixtures have "disappeared" primarily by microbial action (Santos, 1981):

<u>Product</u>	<u>% Transformed</u>
AROCLOR 1242	75%
AROCLOR 1248	60%
AROCLOR 1254	20%
AROCLOR 1260	5%

The Metcalf & Eddy analysis of existing data suggests that predominantly Aroclor 1248 was found in harbor sediment, an Aroclor not believed to have been used on a large scale in the area. Metcalf & Eddy acknowledge that these findings may be the result of large scale 1242/1016 degradation and may also indicate microbial dechlorination of the more recently discharged 1254. The Massachusetts Division of Water Pollution Control, in its 1982 sampling program, also found "Aroclor 1248

predominating greatly in the estuary...." (Malcolm Pirnie, 1982).

It has been reported that Hudson River distributions of PCB Aroclors changed from an upstream measurement of 90% Aroclor 1242/1016 and 10% Aroclor 1254 in the sediment, to 80% 1242/1016 and 20% 1254 in the downstream sediment (Metcalf & Eddy, 1983).

In summary, the present data base indicates that natural degradation of PCB is occurring. Biodegradation of PCB is a process recognized by several expert authorities and has been observed to occur at other sites. Based on these findings, and the fact that both private parties and the EPA are currently actively pursuing biotechnology for the natural degradation of PCB, it would be appropriate for NUS to discuss this remedial technology in their evaluation. Due to the expected lower costs and mitigation of adverse environmental impacts associated with biological remediation, completion of the RAMP studies prior to selection of a remedial action may achieve benefits from this rapidly emerging new technology.

### 3.2 INVALID BASIS FOR FAST-TRACK STATUS

\* The reason most often offered to support a fast-track approach to remediation in the upper estuary is the alleged net

migration of up to 2,000 lbs of PCB per year from that portion of the estuary downward. As discussed earlier, the method used in the USCG transport study to calculate PCB migration is suspect, and PCB migration from the upper estuary does not appear to be of the order of magnitude estimated by the USCG. Given at best high uncertainty over such a migration assessment, a rush to remediation, at a pace faster than technically reasonable and at substantial risk of implementing an environmentally and technically undesirable action, cannot be justified.

\* On 8-14, ¶1, NUS states that the potential human PCB exposure pathways are air, water, sediment and biota, with ingestion considered as the critical PCB exposure pathway to humans. Ingestion exposure would likely require migration of contaminants to the harbor and subsequently to finfish and shell fish in the harbor which would in turn be eaten by humans. Inhalation would be attributed primarily to exposure to volatile PCB. Dermal exposure would be attributed to direct physical contact between humans and contaminated mudflats. Several aspects of these presumed scenarios warrant clarification:

1. It is not clear what basis has been used to arrive at the conclusion that ingestion is the critical human exposure pathway. No human exposure pathway study has

been conducted or planned (the RAMP pathways study does not address human exposure pathways specifically). No quantitative information is available to determine the relative contributions, and therefore the significance of each pathway to human receptors, e.g, the extent of PCB inhalation vs. dermal intake, or the extent of PCB ingestion vs. inhalation.

2. Bilingual signs have been placed throughout the estuary warning people of the potential hazards associated with consumption of fish obtained from that area. These signs, in combination with community awareness of harbor pollution problems, appear to have been successful in substantially preventing human consumption of fish inhabiting the upper and lower estuary.
3. A study of human exposure pathways may determine that inhalation of PCB vaporized by the two New Bedford incinerators has been and is currently a significant exposure pathway; obviously, NUS's proposed fast-track remediation will have no effect on this pathway.
4. A 1982-83 air monitoring study, which attempted to characterize PCB concentrations in the New Bedford

area, has provided enough information to indicate that some areas near the Acushnet River Estuary can exhibit elevated PCB concentrations in the air (GCA, 1983).

The one high volume air sampling station placed directly adjacent to and downwind of the river and mudflats (Station 12: Taber Street) monitored an elevated PCB concentration (as compared to levels in background air) which was nonetheless 50% less than the 24 hour average ambient air PCB guideline used in Canada. However, Station 12 was also located adjacent to a possible PCB shore source (Marsh Island dredge disposal site), which may account for the elevated PCB concentrations found. Other air quality data is similarly inconclusive in that it may be affected by other terrestrial sources of PCB. Thus, it is not clear to what extent a fast-track program might improve ambient air quality.

5. Data generated from the 1983 GCA study is inconclusive because of its limited nature. For example, the mudflats were exposed to a greater solar loading on the September 3 monitoring day as compared to the September 9 monitoring day, the only two days of reliable air sampling performed by GCA. However, there was no significant difference in PCB air concentrations recorded for those days,

contrary to what would be expected for these different climatic exposure conditions.

6. Because the PCB air concentrations were at least 39% below the Canadian 24 hour average ambient air PCB guideline, it would seem that the elevated PCB exposure risk (as compared to average urban conditions) (3-24) is in an acceptable range. The City of Philadelphia has set an ambient air quality PCB standard of 180 nanograms per cubic meter ( $\text{ng}/\text{m}^3$ ) and the State of New York is currently using  $1,600 \text{ ng}/\text{m}^3$  for permitting. All sampling in the GCA test near the river indicated PCB air concentrations less than  $100 \text{ ng}/\text{m}^3$ . Based on a comparison of this New Bedford PCB air quality data with all of these air standards, a significant human health risk does not appear to exist.
7. The last potential route of exposure identified by NUS is human dermal contact through direct physical contact with contaminated mudflats. As noted above, signs have been placed throughout the harbor area warning people of the potential risks associated with direct contact with PCB in the mudflats (as well as

consumption of fish taken from the area and swimming in the harbor). There is no data to suggest that these signs, in combination with public awareness, are ineffective in minimizing or preventing dermal exposure to PCB on the mudflats. NUS should further evaluate and quantify this concern by including observations and knowledge of actual site conditions. Moreover, dermal pathway risks can be substantially reduced, as suggested in the NCP, by installation of a security fence to isolate selected areas.

\* An independent evaluation of the human health hazards associated with PCB, prepared by David D. Rutstein, M.D., has been submitted. Based on this independent evaluation, the basis for considering PCB toxic to humans is questionable, the only known associated adverse impact being the incidence of chloracne. Given such uncertainty concerning toxicity, fast track remediation of the scope contemplated is unwarranted.

\* Past Superfund sites provide no precedent for assigning a novel fast-track status to remediation of the upper Acushnet River Estuary. Other sites, posing much greater, documented and potential adverse impacts to human health and the environment, have not been so precipitously treated. Such an approach at New Bedford appears, then, unprecedented, unjustified and arbitrary.

\* Existing data indicates some natural remediation in the upper estuary through deposition of relatively clean, fine-grained sediment over sediments currently contaminated with PCB, in combination with natural degradation of PCB. These natural processes mitigate against fast-track disruption of the current environment without all the implications of such action well thought out as part of a comprehensive, technically and legally viable approach to remediation in the harbor.

\* Potential threats identified by NUS appear much less significant than what is claimed in its feasibility study, nor do they provide the needed basis for a fast-track program for implementation of final remedial alternatives. The NUS proposals cannot be accomplished in a short period of time, nor were they even intended to address the question whether initial remedial measures were appropriate. If initial remedial measures were called for, NUS could develop methods to address perceived risks without prematurely undertaking a full-fledged cleanup of portions of the harbor at this early stage. At a fraction of the cost of the proposals under consideration, and at much less risk to the public and the environment, an interim remedial program could be developed to address the concerns postulated as the basis for the fast-track.

In summary, due to lack of definition of the actual risks associated with the upper estuary, the lack of data to describe

site conditions and develop remedial programs, the risks associated with improper remediation, current uncertainty over PCB toxicity, the lack of precedent for a fast-track approach at similar sites, and the alternative of short-term rapidly implemented interim measures--if any were needed--the EPA does not have a valid basis to proceed in the manner contemplated.

### 3.3 ASSESSMENT OF SITE CONDITIONS

NUS has made several assumptions concerning the New Bedford Harbor area which relate to remediation of the harbor. Some assumptions were not developed in the report, and consequently potential misconceptions should be noted:

\* NUS states on 3-34 that the harbor inside the hurricane barrier is "permanently" closed to the taking of lobster, shellfish and bottom-feeding fish. That label is somewhat misleading. Shellfishing has been prohibited in the harbor intermittently since the early 1900's and has been continuously closed for the past 20 years due to sewage pollution. Although this prohibition will continue for the foreseeable future, it cannot technically be termed permanent since it is possible that the sewage discharges will be abated. It was also suggested by implication (3-35, ¶4 and 8-2, ¶2) that shellfishery contamination will be remedied with PCB cleanup or isolation; however, the sewage pollution of shellfish and

associated closure of that fishery is separate and distinct from any PCB remediation.

\* In the case of the lobster fishery, no measure of harm/benefit has yet been directly associated with any of the proposed remedial expenditures since there is no reliable transport data to relate upper estuary contamination to Buzzards Bay lobster populations living several miles away. It may be that lobsters are contaminated more from outer harbor PCB sources than by transport from the upper estuary. PCB contributions from the Clark Point sewage outfall (up to 700 lbs./yr.: Weaver, 1982) and the West Island dredge disposal site may be more readily available PCB sources to the offshore lobster populations since these sources are much closer to Buzzards Bay than the upper estuary.

#### 4. REGULATORY CONSIDERATIONS

Questions concerning the NCP requirements have been addressed above in Pt. I, Legal Analysis, as has the general applicability of numerous other legal requirements such as RCRA and TSCA. The NUS landfill designs, though only limited detail is provided in the NUS report, clearly do not meet the requirements of 40 C.F.R. §264 and thus would not be eligible for RCRA (or TSCA) permits. To be eligible for a RCRA permit, the design would have to be more extensive and thus, the

associated costs for construction would be significantly higher. In the May 15, 1984 Record of Decision for the remedial program at Waukegan Harbor, the Region V EPA Regional Administrator denied a TSCA landfill permit for PCB contaminated wastes for failure to meet TSCA regulations.

RCRA/TSCA siting and regulatory requirements for a landfill facility include:

- evaluation of seismic activity in Holocene time
- location of facility above the 100-year floodplain
- prohibition of siting facility in wetland
- siting of facility over soils of low permeability (less than  $1 \times 10^{-7}$  centimeters per second)
- an adequate buffer zone
- complete definition of geologic, hydrologic and meteorologic conditions, and
- consideration of land use, proximity of residences and location of public facilities.

Noncompliance with these requirements raises serious environmental concerns.

### III. CONCLUSION

AVX has legitimate and substantial concerns regarding the safety, permanence, short-term adverse effects, long-term integrity and cost-effectiveness of the proposed remedial actions. Because of serious questions and current

uncertainties regarding the proposed remedial construction projects, further evaluation of the projects is necessary prior to selection and implementation of a remedial program. In view of the technical difficulty in implementing any of the proposed remedial programs, the need for both long-term performance and environmental integrity, and the potentially high costs, it is essential that any remedial program be carefully and logically selected to avoid the specter of re-remediation.

In particular, some technical concerns regarding the proposed remedial programs are as follows:

- Poor definition of the type, concentration and location of pollutants in the upper estuary.
- The absence of geotechnical data required to characterize the estuarine sediments and determine sediment bearing capacities for hydraulic and sediment containment structures.
- The absence of calculations and assumptions in the NUS report for the various proposed remedial actions.
- Insufficient definition of sediment dynamics in the estuary so as to quantify PCB contaminated sediment

migration from the upper estuary to the lower estuary and bay.

- The absence of a comprehensive PCB mass balance on estuarine sources and consequent source control program, which would reduce the risk of rerediation at some future time.
- Omission of evaluation of all feasible technologies in NUS's study.
- The absence of a quantitative and historical basis for selection of the PCB cleanup target value of 1 ppm.
- The lack of data characterizing PCB decomposition processes within the estuary.
- Insufficient justification and evaluation of determinations as to the depth and area of PCB contamination and selection of the PCB cleanup target value for fast-track remediation defects which may result in sediment removal that is unnecessarily excessive and may cause options that would otherwise be feasible to be excluded.

The NUS draft feasibility study, with all its deficiencies and unanswered questions (raised in Pt. II above), is insufficient under CERCLA and NCP (as well as numerous other statutes and regulations). Consequently, a decision by EPA to implement any one of the NUS recommended alternatives (particularly the dredging alternatives EPA has said are its preferred options) is legally unsupportable. Even more significant than the likely failure to achieve the mandated goal of cost-effectiveness is the threat that the NUS alternatives, rather than advancing interests of public health or the welfare of the environment, will have the opposite effect. AVX, therefore, strongly recommends reconsideration of the remedial alternatives proposed by NUS to date after completion of the studies deemed essential in the RAMP to a full remedial investigation. Such an approach is the only way to achieve the most cost-effective and environmentally sound remedial alternative, not only for the upper Acushnet River Estuary but for all of New Bedford Harbor.

## APPENDIX

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